

CHEMICAL VAPOR DEPOSITION METHODS AND APPARATUS**Abstract**

The present invention provides methods and apparatus for vaporizing and transporting precursor molecules to a process chamber for deposition of thin films on a substrate. The methods and apparatus include CVD solvents that comprise ionic liquids. The ionic liquids comprise salt compounds that have substantially no measurable vapor pressure (i.e., less than about 1 Torr at about room temperature), exhibit a wide liquid temperature range (i.e., greater than about 100°C), and have low melting points (i.e., less than about 250°C). A desired precursor is dissolved in a selected CVD solvent comprising an ionic liquid. The solvent and precursor solution is heated to or near the precursor volatilization temperature of the precursor. A stream of carrier gas is directed over or is bubbled through the solvent and precursor solution to distill and transport precursor molecules in the vapor phase to a deposition chamber. Conventional deposition processes may be used to deposit the desired thin film on a substrate.